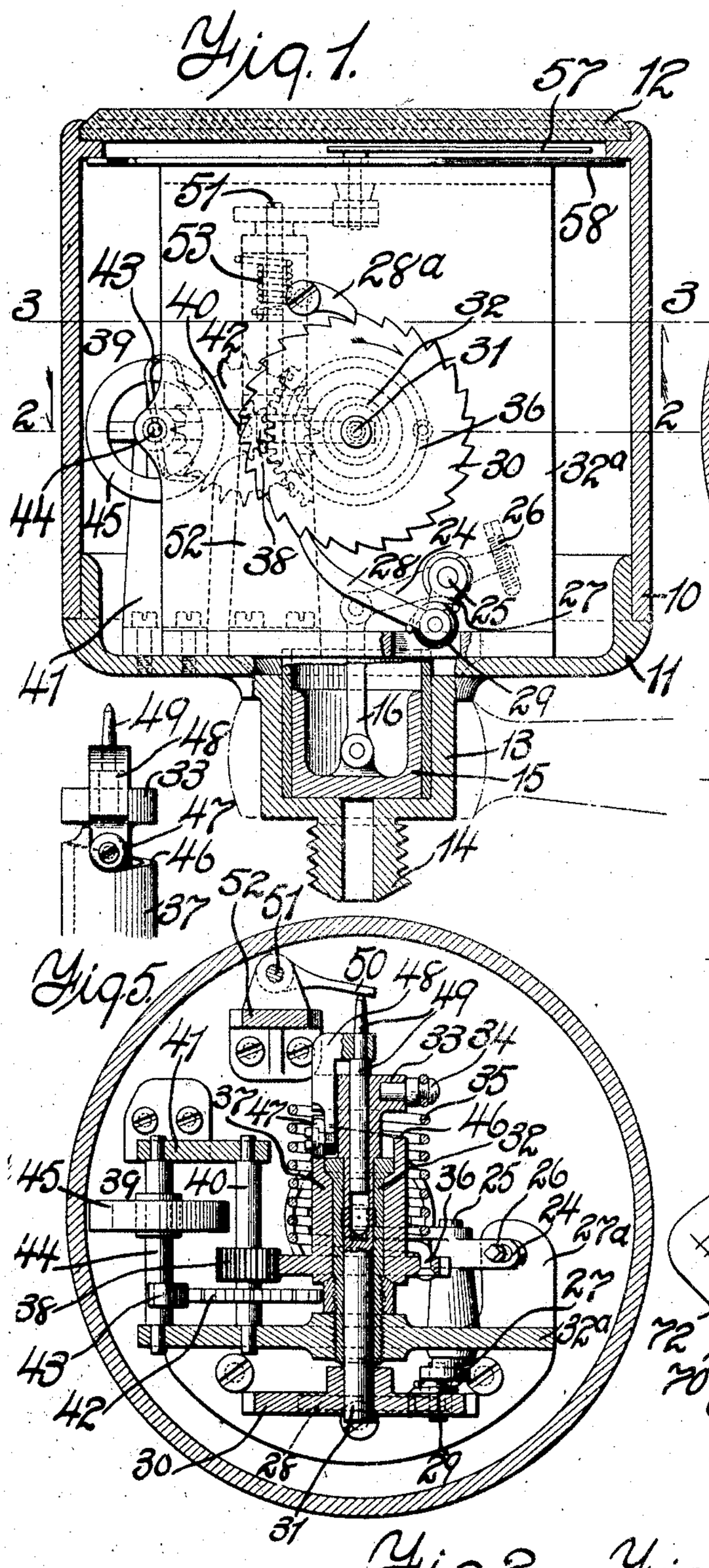
No. 876,256. PATENTED JAN. 7, 1908.

C. R. BENTON.

SPEED INDICATOR.

APPLICATION FILED MAR. 20, 1907.

Fig. 1.



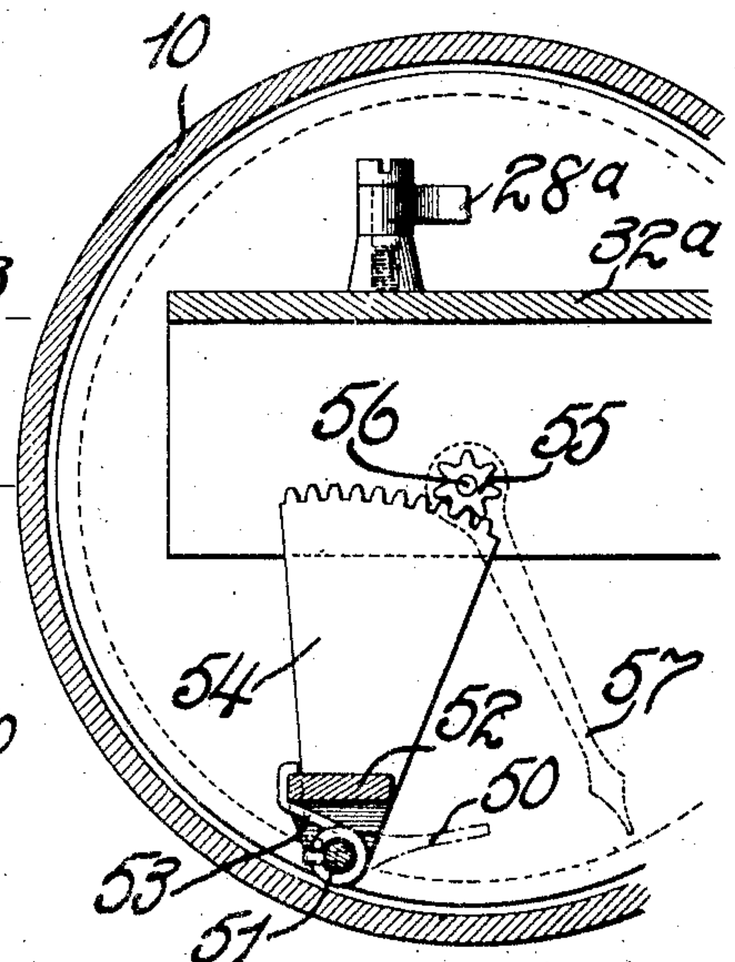


Fig. 3.

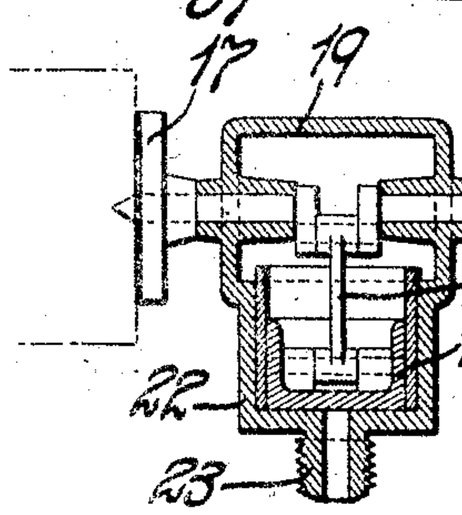


Fig. 5.

Fig. 4.

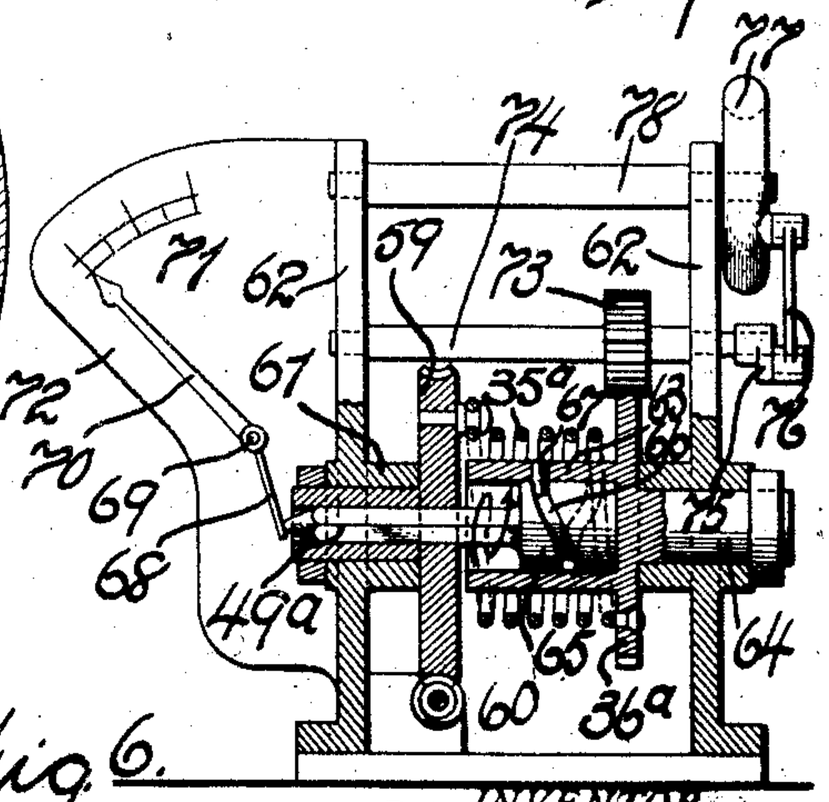


Fig. 2.

Fig. 6.

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SPEED-INDICATOR.

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To all whom it may concern:

Be it known that I, CECIL R. BENTON, of the city of Vergennes, Addison county, State of Vermont, have invented a new and useful Improvement in Speed-Indicators, of which the following is a full, clear, and exact description.

My invention relates to improvements in speed indicators, and the object of my invention is to produce a simple, effective, and reliable device of this kind, which can be used on automobiles, or can be used in connection with any rotary shaft or other moving device, to indicate speed.

In carrying out my invention, I use a torsion coil spring as an operative connection between a part of the mechanism and the indicating device, and arrange the spring so that its variations of tension will be nicely and accurately indicated, and I also construct and arrange the parts so that the tension of the spring increases with the speed, and therefore by measuring the variations of tension, I measure the speed and indicate it. There are a number of mechanical ways in which this idea can be carried out practically, and therefore I do not limit myself to particular details of construction, but show a practical means of carrying the invention into effect.

With these ends in view, my invention consists of certain features of construction and combinations of parts which will be hereinafter described and claimed.

Reference may be had to the accompanying drawing forming a part of this specification in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a vertical sectional elevation of the device embodying my invention. Fig. 2 is a cross section on the line 2.2 of Fig. 1. Fig. 3 is a cross section on the line 3.3 of Fig. 1. Fig. 4 is a detail section of a means for pumping air to the operating cylinder. Fig. 5 is a detail of a part of the means for transmitting movement to the indicator, and Fig. 6 is a longitudinal sectional elevation of a modified form of the device.

The structure should be provided with a suitable casing 10, which can be of any approved design, and as shown this is supported on a base 11, and has a transparent top 12, through which the indicator can be read. On the base is a cylinder 13, which has a nipple 14 adapted to connect with a rubber hose or other pipe, and in this cylinder works a reciprocating piston 15 which, through the medium of the pitman 16, operates the mechanism to be hereafter described.

The operating mechanism and indicator can be actuated in any suitable operative way, as will presently appear, but I find a convenient way is to use the reciprocating piston 15 and operate it by air perssure, although this is not essential to the invention. Where this is done, however, I can conveniently use some sort of pump, and the pump shown in Fig. 4 answers the purpose. Here a disk 17 is driven from a frictional connection with some moving part, as with the end of a shaft, and it turns a crank shaft 18 contained in a suitable housing 19, and through the pitman 20 operates the plunger 21, which works in the cylinder 22, and which constitutes an ordinary air pump. The nipple 23 provides for connecting with a pipe.

Fig. 4 is shown on a reduced scale, but the pump should be of a size amply large enough to operate the piston 15, already referred to. It will be noticed that every stroke of the piston 21 will supply air to the piston 15, and at each impulse this piston will rise and will communicate its motion to the rocker arm 24 (see Fig. 1) which arm is carried by the shaft 25, and has at one end a set screw 26, which by abutting with the plate 27^a beneath, limits the movement of the arm, and causes the ratchet wheel 30, to be presently described, to be moved a distance of one tooth only.

The rock shaft 25 has a crank arm 27 on which is pivoted a pawl 28, and this is normally pressed by a spring 29 into engagement with a ratchet wheel 30, which is shown clearly in Figs. 1 and 2, and which carries a shaft 31, which in turn is journaled in a sleeve or bearing 32, and the latter is mounted on a framework 32^a. The ratchet wheel is prevented from turning back by a detent 28^a. The shaft 31 has a flange 33 at one end, in which is held the pin 34, which forms a convenient means of attaching to the shaft one end of the torsion coil spring 35, which at its other end is attached to the gear wheel 36. This has an elongated bearing or sleeve 37, which is journaled on the outer side of the bearing 32, and so motion will be transmitted to the gear wheel 36, through the resilient pressure of the spring 35. The gear wheel 36 meshes with a pinion 38, forming a part of an escapement 39, which is of the conventional

type. This shows a shaft 40, driven by the pinion 38, and mounted in the framework 32ª and a standard 41. The shaft 40 carries an escapement wheel 42, which is regulated by the common form of pallet 43, carried on the shaft 44, which is journaled in the parts 32ª and 41, and which has a balance wheel 45.

One end of the sleeve 37 is formed into a cam 46, which carries the roller 47 moving on its surface, and this roller is journaled on one end of the bent arm 48, through which passes the reduced end of the shaft 49, this moving longitudinally in the hollow end of the shaft 31, already referred to. It will be seen that as the shaft 31 is turned, it will transmit motion to the gear 36, solely through the spring 35, and that as the gear 36 is retarded in its movement by the escapement 39, or equivalent retarding means, the tension on the spring will be slight during a slow movement, but will increase with the increase of speed in the shaft 31. As this speed increases, the relative position of the shaft 31 and the gear wheel 36 changes, as the shaft advances for a time faster than the gear wheel, and this advance movement gives increased tension to the spring, and as will presently appear, I measure this increase of tension. In other words, the outward movement of the shaft 49 increases regularly with the increased speed of the shaft 31, and I utilize this fact to make the part 49 operate reliably a suitable indicator. Obviously this can be done in several ways, but the simplest way, and I believe the best, is to actuate the crank 50 by the movement of the shaft 49, and so turn the vertical shaft 51 which is carried by the crank 50. This shaft 51 is journaled in suitable supports on the standard 52 and it is held against the shaft 49 by a spring 53. The shaft 51 carries a segmental gear 54 (see Fig. 3) which meshes with the pinion 55 on the stud 56, which is mounted on a part of the frame 32ª, and the stud 56 carries a hand or indicator 57, which moves over a plate 58 lying below the glass 12. This plate can be marked off in any of the usual ways, so that the speed would be indicated on it by reason of the hand or indicator 57.

In Fig. 6 I have shown another means of measuring speed by the variation of torsion in the spring, to show that I am not limited to one particular way of carrying out this idea. As here shown, instead of using air pressure, I use a worm 60, which can be driven in any usual way, and this meshes with a worm-wheel 59, which is mounted in suitable bearings 61, on a supporting frame 62. The worm wheel 59 connects with the torsion coil spring 35ª, like the spring 35, already described, and the other end of the spring connects with a gear wheel 36ª, which has a cylinder 63 on one end, and a shaft 64 at the other, the shaft turning in suitable bearings so as to support the wheel 36ª. Within the cylinder 63 is a cam 65, which has a groove 66 therein, and this engages the pin 67 on the cylinder 63. The cam has a reduced extension 49ª sliding through and turning with the gear 59, and communicating with the crank 68 on a rock shaft 69, and this carries a hand or indicator 70, moving over the scale 71 on the plate 72. The gear wheel 36ª instead of connecting with an escapement, connects with a pinion 73 on a shaft 74, and the shaft has a crank 75 connecting by a pitman 76 with a relatively heavy balance wheel 77 on the shaft 78. The shafts 74 and 78 are mounted in the frame 62. It will be observed that the crank connection between the shafts 74 and 78 will oscillate the balance wheel 77, and the oscillation of this heavy wheel will serve to retard the gear 36ª.

It will be observed that the principle is exactly the same in this structure as in the other figures, and that in either case the essential thing is to have the speed transmission through the torsion spring, and to measure the variation of tension in the spring.

The drawings show practical means of measuring this variation of spring tension, and, as stated, I do not limit myself to the precise construction shown, although I claim the structure in the main as a feature of the invention. In such a structure, some means for retarding the part driven by the spring is necessary, and I claim any retarding means for this purpose, and particularly the stopping and starting of a heavy member as a balance wheel.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent:—

1. A speed indicator comprising a rotary member having means for driving it, a second member, a torsion spring connecting the two members and driving the second member, means for retarding the spring driven member, a reciprocating member moved by the spring variation, and an operative connection between the said reciprocating member and an indicator.

2. A speed indicator comprising a rotary member having means for driving it, a second rotary member, a torsion spring connection between the two members, means for retarding the spring driven member, a reciprocating member, cam actuated means for moving the reciprocating member from the spring driven member, and means for operating an indicator from the reciprocating member.

3. A speed indicator comprising a rotary member having means for driving it, a second rotary member, a torsion spring connecting the two members and driving one from the other, means for retarding the spring driven member, an indicator, and an operative connection between the indicator and the spring driven member.

4. A speed indicator comprising a rotary member, a second rotary member, a torsion spring connecting the two members, means for retarding the spring driven member, a reciprocating member, an operative connection between the reciprocating member and the spring driven member, and an indicator operated from the reciprocating member.

5. A speed indicator comprising a rotary shaft having means for driving it, a gear wheel loosely journaled on the shaft, a torsion spring driving the gear wheel from the shaft, retarding means connected with the gear wheel, a reciprocating shaft mounted in the end of the first mentioned shaft, means for moving the reciprocating shaft from the spring driven gear wheel, and an indicator operated from the reciprocating shaft.

6. A speed indicator comprising a shaft, a ratchet mechanism for driving it, a gear wheel, a retarding mechanism connected with the gear wheel, a torsion spring driving the gear wheel from the shaft, a reciprocating member, means for moving the reciprocating member from the gear wheel, and an indicator operated by the reciprocating member.

7. In a device of the kind described, the combination with the main shaft, of a retarding device the gear wheel geared to the retarding device, a cam operated from the gear wheel, a shaft moved by the cam, an indicator, and an operative connection between the last mentioned shaft and the indicator.

8. The combination with the indicator operating mechanism, of a cylinder and piston, means for operating the piston, and a pawl and ratchet connection between the piston and the indicator mechanism.

9. In a speed indicator, the combination with the recessed driving shaft and the loose gear wheel thereon, of a cam turning with the gear wheel, a retarding device connected with the gear wheel, a sliding shaft moving in the main shaft, a sliding arm connected with the sliding shaft and working in the recess in the main shaft, a connection between the sliding arm and the aforesaid cam, an indicator, and means for operating the indicator from the sliding shaft.

10. A speed indicator having movable parts connected by a torsion spring, one of said parts being moved by the spring, an oscillating member, an escapement controlling the oscillating member and connected with the spring moved member, and means for indicating the variation of tension in the spring.

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